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DENTISTRY IN FLORIDA

Vol. X No. 6

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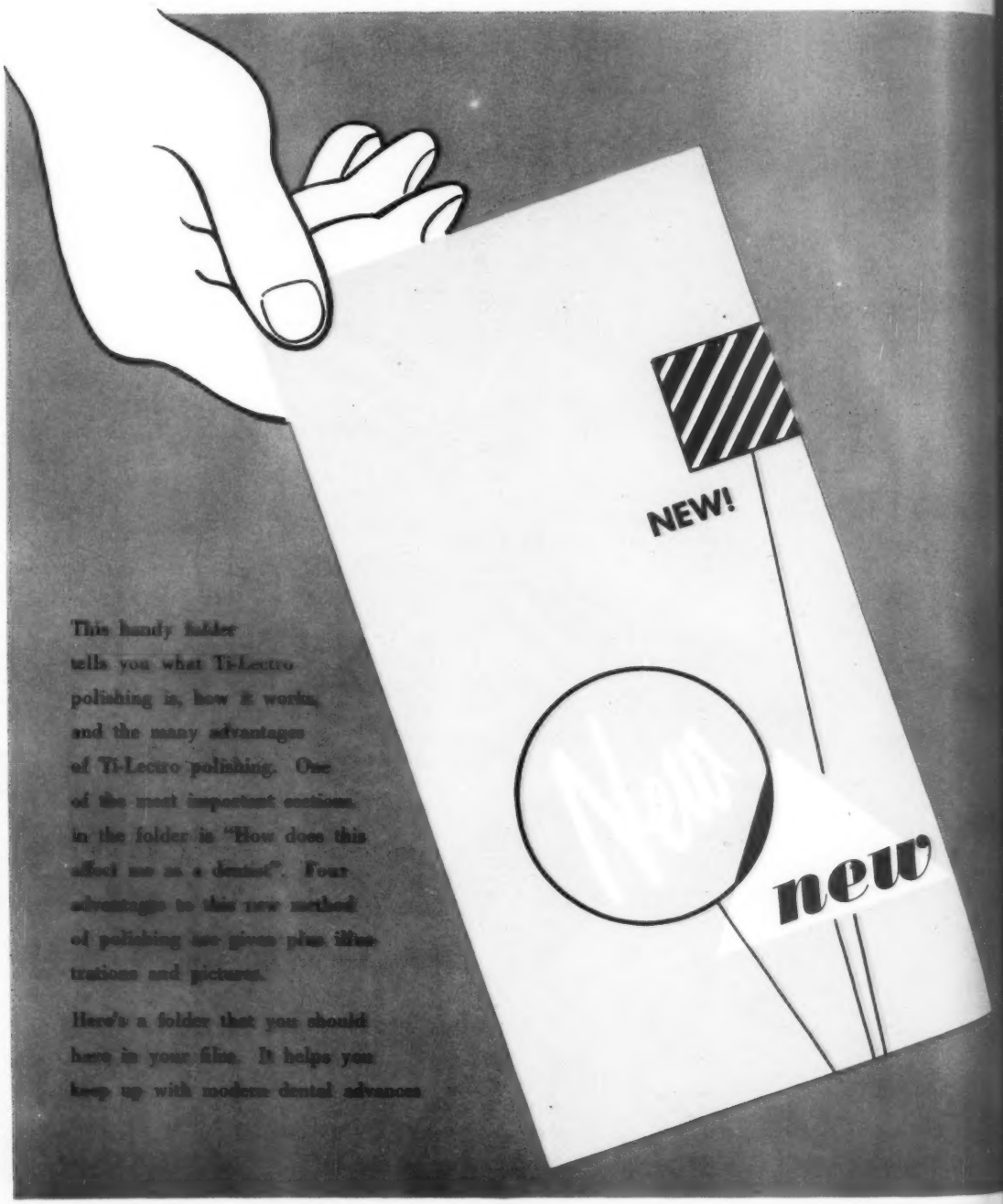
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Editor, JOSEPH STRACK

June 1951 — Vol. X, No. 6

DON'T LET THE PATIENT SET YOUR FEE!
A suggested solution for the problems created by the bargain hunters in dental offices 1

A SURE-FIRE PORCELAIN CROWN TECHNIQUE
"This technique pays off in that it has the aesthetics of the porcelain jacket combined with the strength, the durability of the full-cast crown" 3

MY PAINTER THINKS HE'S PICASSO
You may think that having your office painted is not a major enterprise, but— 4

THAT MAN IN THE LABORATORY
"Here are ten important tips for teamwork between the dentist and the man in the laboratory" 6

THE ROLE OF GRAIN SIZE IN CAST COBALT-CHROMIUM DENTAL ALLOYS
An important interpretation by a distinguished metallurgist 8

Rx FOR LIVING
The story of a dentist who is devoting himself to community betterment—local, national, and international 14

DOCTOR, DO YOUR PATIENTS NEED THESE LESSONS?
A patient describes an incident that should interest all dentists 16

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Don't Let the Patient Set Your Fee!

By ROLLAND B. MOORE, D.D.S.

ALMOST every dental office in the United States has, at one time or another, been afflicted with bargain hunters—people who go from dental office to dental office seeking low fees and getting free information. Dentists lose hours and hours of time on them. Some bargain hunters will brazenly try to beat down a dentist's fee by saying that Doctor Jones or Doctor Smith had offered a "lower price." In such cases, a dentist should say, "That is the place for you to go then." Other bargain hunters will tell you they are merely calling on behalf of a friend.

I had such a visitor the other day. A man spoke to me about dentures for his wife and asked my fee. I took him into my operating room, showed him samples of my work, and quoted my fee. When I asked him about extractions, he said her teeth had been extracted twenty-one years ago. He said my fee was satisfactory and he would tell his wife. If he could get her to come in, they were to call the following week. They did not call.

A few days later I mentioned the incident to a friend. He laughed and said, "They have been shopping around for plates for her for the last twenty years, and they haven't bought any yet." You can imagine how much time this one couple has cost dentists.

Another bargain hunter visited me that same week. He required a full upper and a partial lower. No extraction was needed. He had been without upper teeth for a long time and his gums were in bad condition and with heavy muscle attachments. Below, he had lost all of his molars and one bicuspid. I showed him samples and quoted him my fee. I told him that I had time then to take his impressions. He climbed out of my chair and said he would think it over. I had spent a full hour with him.

I said to him, "Listen, you've been thinking this over for years. The fact that you are here now to see me is sufficient proof that you have. Why think it over any longer? You are not getting any younger while you wait. It is something you need and you know it, so why hesitate?"

He put on his cap and coat, and said, "If I decide to get the plates, I'll be back this afternoon, instead of driving home this morning." He never came back. I learned he had been to every other dentist in this county and the next county.

Bargain Hunters and Price Cutters

We dentists ourselves are responsible for these bargain hunters. They would not exist if it were not for price cutters in our profession. Our dental societies suggest the fees we should charge, but all of us do not follow the recommendations. To get a patient away from a competitor, a price cutting dentist will lower his fees. Some people know that, and for that reason—and that reason alone—they wander from dental office to dental office trying to get the lowest fee on their work.

Fee Schedules Proposed

Physicians work on a different plan than ours. Their medical societies recommend the fees they should charge, and they adhere to

those fees. They don't let anyone suffer for lack of money, however. Rather than cut their fees, physicians make no charge at all. They charge so much for an office call which does not include any medicinal agents; anything dispensed is charged for. Calls outside of the office are assessed according to the distance involved, and whether it is a day call or a night call. Physicians do not give free medical check-ups. But we dentists, in most cases, give free mouth examinations that take time away from our paying work, and the public expects it to be that way. A number of dental patients shop in one dental office and another to see if Smith will make "a lower price" than Jones. All this because we do not exercise any controls. But in most States, medical societies set the fees the members may charge and if the members don't charge them, they get slapped down. It should be the same in dentistry. If we worked on set fees, we would eliminate the bargain hunters altogether. They would no longer come into our offices, stealing our time.

Of course, we have those among us who would insist, "I'll charge what I please; it is no one's business but my own." Yes, and cut their noses off to spite their independent faces. I would be only too glad to work on an enforced fee basis, if the basis was high enough, to get rid of these people who steal my time. They don't try it on physicians, why should we allow them to try it on us? They don't go into a law office for information and expect to get it free. But they don't hesitate to go into dental offices for free professional guidance.

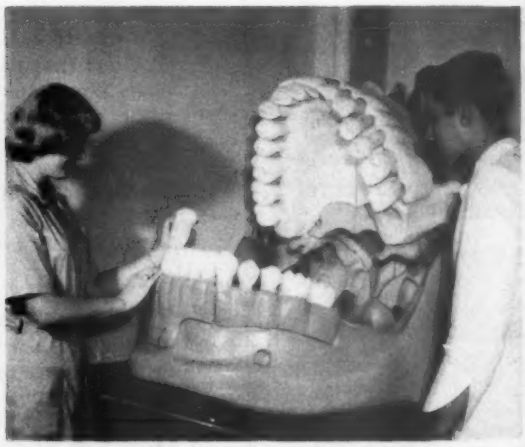
Another bargain-hunting experience I had typifies all of this. A man came into my office and said, "I need an upper plate. I went to other offices, but they want too much money. So I come to you." I showed him my samples and quoted my fee. He countered with an offer—60 per cent below my fee. Frankly, I told him where he could go. I handed him his hat and cane, then turned on my heel and went out to the laboratory to talk to my technician. Would that man have tried to beat down his physician's fee? Would he have asked his physician his fee before the physician treated him, and then offer less than the physician's fee?

Apparently there isn't a thing we can do about this situation until sets of fees are established by the various dental societies and the members of the societies adhere to such fee schedules. Such schedules, of course, would vary in different communities because of the differences in living costs and other factors that must be considered.

I do not know of any other profession that has allowed the public practically to set the fees it will pay. It is time for dentistry to do something about this situation, Doctor.

Dentistry in the Press

Dr. Stuart F. Lampe, Atlanta, Ga., said he was so busy he couldn't take time off for a regular wedding, but he did want to marry his pretty blonde assistant, Marjorie Collins, *Wide World Photos* reports. So when the Rev. Glen Hanie phoned for a dental appointment he was asked to officiate at a wedding.



This huge model mouth helps dental laboratory students Pvt. Shirley Shelton, Toledo, Ore., and Pfc. Anthony Koko, Boston, Mass., learn dental anatomy. One of the advanced courses, the dental technicians' instruction lasts sixteen weeks. (Official Defense Department Photo—Army, from *Wide World Photos.*)

A Sure-Fire Porcelain Crown Technique

By WILLIAM POINDEXTER, D.D.S.

ARE you having trouble, Doctor, in making a porcelain or acrylic jacket stay in the mouths of your "closed-bite" cases? That is, those cases where the vertical dimension between the jaws has decreased to such a point that the fragile porcelain or acrylic jacket refuses to stay put after cementation because of the excess force or strain exerted on it by the teeth? If so, then you aren't alone, for, at one time or another, all of us run into one of these difficult "closed-bite" cases where the patient wants a jacket, and it's up to us to deliver, make the case as durable, as aesthetically perfect, as is possible.

Constructing a beautiful jacket isn't difficult, but in a case of this kind it's a headache to make one durable. That's a sad fact which has been brought home to me many times, what with my having to recement jackets which I formerly made innumerable times for this type patient. But no more. I've found the answer to the problem in a sure-fire technique which embodies the porcelain jacket with the full-cast crown.

The Technique

Here are the steps for this technique, to be used on any tooth to be jacketed in a "closed-bite" case:

First, with circular disc make a full crown preparation, removing enough tooth structure all the way around to compensate for the thickness of both gold and porcelain.

Second, take a compound impression of the tooth in a trimmed copper band and pour up a stone or an amalgam die. Carve the wax pattern for the crown. Some men, instead of taking a compound impression, take a hydrocolloid impression of both jaws or arches, pour up a stone model, and carve the wax pattern to this. One thing to watch in carving the pattern: Be certain to allow full thickness to the wax on the buccal or labial in order that a "window" or opening may be cut in the wax for the addition later of the porcelain facing. This "window" is not cut clear through the wax, but carved to paper thinness on its floor, or adjacent the tooth. Carve the "window" far enough around on the mesial and distal borders of the pattern so that when the crown is finished no gold will show when the patient opens his mouth. In other words, far enough around on the mesial and distal borders of the tooth so that any gold of the finished crown will be hidden by the adjoining teeth.

Third, cast the crown. A good, hard gold is recommended here, for remember that the purpose of this crown is to help withstand the excess strain found in this type case.

Fourth, rough-polish the crown and floor of the "window."

Fifth, place the crown on the amalgam or stone die and sink into a globe of plaster of paris leaving the window free.

Sixth, take a compound impression of the "window" portion of the crown, box this impression and make an amalgam die.

Seventh, adapt a platinum matrix to this die, then mix the desired shade of porcelain and bake the porcelain inlay in the furnace.

Eighth, before setting the finished inlay to the crown, make sure there is about one millimeter of gold edging the inlay all the way around. There will be, providing the previous steps have been carefully carried out. This is to allow for the final polishing of the crown, and to give added strength to the edges of the porcelain inlay. Now cement the porcelain inlay into the "window" of the gold crown and polish the one millimeter of gold that is remaining around the edges of the inlay. Always do this polishing while the cement is setting, and polish from gold toward porcelain, for this helps lock the porcelain inlay to the crown. Last, final-polish the rest of the crown and it is ready to be cemented in the patient's mouth.

By using this technique we find that we *can* make a porcelain jacket, for this is actually what we've done—only given our porcelain restoration the backing of a full-cast crown for those "closed-bite" cases where heretofore the making of such a jacket was next to impossible, impossible because it would come uncemented from or break off from the tooth. This technique pays off in that it has the aesthetics of the porcelain jacket combined with the strength, the durability, of the full-cast crown.

My Painter Thinks He's Picasso

By JOSEPH MURRAY, D.D.S.

PAINTING a dental office usually is not a major enterprise, but when the painter thinks he is endowed with supernatural gifts that belong only to artists of world renown, then the complications that may arise can indeed be catastrophic.

It all came about when a patient, sitting in the dental chair, unwittingly gazed upward and noticed a crack in the ceiling.

"You can use a paint job, Doc," he said. "And if you let me do it, I'll guarantee it to last for five years. Besides," he added enthusiastically, "I'll throw in a mural gratis."

That last statement should have put me on guard, but his earnestness and enthusiasm won me over; so I gave him the job.

"You may as well do the waiting room, business office, and lab, too," I said. "This office hasn't been painted in two years."

I consented to let him work on a per diem basis instead of making a regular contract, because it hurt his artistic pride to rush through a job.

"Of course, the paint and incidental supplies are extra," he added.

Considering myself lucky to get so talented a craftsman, I consented to the conditions he imposed.

Well, it turned out that my painter was not only an artisan of merit, but a perfectionist and a Don Juan combined. Unlike the average house painter who likes to be done with a project in the shortest possible time, be paid off, and moving to another enterprise, my man tackled his work like The Man Who Came to Dinner.

A Painter Reports for Work

Mr. T. was no ordinary painter. From his Menjou-like moustache to his impeccable attire—more appropriate for the theatre or opera—my painter reported for work each morning looking more the Wall Street broker than the purveyor of paint. So impressed with his professional air was a new patient that the latter mistakenly addressed him as "Doctor."

And when he finally got into his working clothes and manicured his nails—unhurriedly of course, since it was my time he was wasting—he would immediately begin criticizing the previous painter's handiwork.

Here was a perfectionist that reminded me of a dressmaker-patient who wanted me to tuck in a plastic denture like the pleats in a dress.

Mr. T.'s consuming passion to fill in hair-line cracks in the window sills, or sponge the walls, bordered on the neurotic. On other occasions, he would complain, "Got to rip off that moulding. It collects too much dirt."

Watch Your Color Scheme

And the way he matched colors was a revelation. His choice was perfect for one who was color-blind. To him, beige was pink, and mustard-yellow he called rusty gold. He balked terribly when I suggested the latter color for my waiting room. Evidently, he had never seen that shade before. But I thought it was soothing for the patient and restful to the eye. With great misgiving, he condescended to execute the color scheme my way.

Later, he told me that mustard-yellow did not look so bad after all. "As a matter of fact," said he, "I'm thinking of using the same color in my own apartment."

Many of these character traits I attributed to artistic temperament. But, when it dawned upon me that it was fifteen days now since that man with the brush leisurely began applying his creative power—at eighteen dollars per day, plus materials, and the end was nowhere in sight—I timidly inquired, "How much longer, Mr. T?"

"Can't tell yet, Doc," he replied. "Just discovered that the ceiling is crooked. Have to straighten that out first." And, as an afterthought, he said, "I almost forgot about the mural."

When my painter was not tinkering with crooked walls and ceilings, he was filling microscopic nail holes with putty, or wandering into the operating room on some pretext or other. Invariably, he would choose the moment when a particularly attractive blonde patient was in the chair to say, "When I was in the Navy, Doc, we painted the door knobs black. Whether you like it or not, that's how you're getting it."

Delusions of Grandeur

Then, changing the subject, he would begin a learned discourse on murals. With one eye on the patient, he would say, "Do you know something, Doc—I don't like that Diego Rivera fresco in your waiting room. When that man Rivera says that abstract art is not American, he's talking through his sombrero."

Continuing his lecture, and still scrutinizing the blonde, he would say, "My money is on Stuart Davis. There's a painter who's the abstractionist's pride."

"As for myself," he admitted freely, "my murals are a cross between the surrealism of Dali, the sensitivity of Van Gogh, the exoticism of Gauguin, and the stark realism of Picasso. There's a painter! He and I paint alike. How about doing something like the battle of Guernica, in your operating room, Doc?"

Only with the greatest effort could I prevail upon him to refrain from reproducing Picasso's bloody Guernica on my operating room-wall. I believed that patients were reminded of enough bloodshed in a dental office; so I promised to consider settling for a peaceful country landscape, with a meandering brook—in the bathroom.

Perhaps a Sigmund Freud or a Karen Horney could have ascertained what inner urge made an ordinary house painter aspire to the artistic level of Gauguin or Picasso. But, time and money were running out on me, so I was disinterested in the psychoanalytical interpretation. All I knew was that the painting nightmare had to end soon. So I hit upon a plan.

How to Fire a Painter

Like the Cleveland firm that passed out 1951 automobiles for the personal use of its seventy employes, just to make them happy, I did as much for my painter; only, of course, on a more modest scale.

As a good will gesture and for my own salvation, I allowed him to paint—in the bathroom, of course—a mural of these Elysian fields with the babbling brook flowing under a rustic bridge. To be doubly sure that he would quickly finish the job, I introduced him to the beautiful blonde patient.

From the latest reports I have gathered, they are still painting the town—red, white and blue.

Repairing and Gardening —Do's and Don't's

This is the time of the year when many dentists are deep in gardening and home repair chores—or planning them. Dr. Harold M. Erickson, State Health Officer of Oregon, has compiled, for the *Oregon Health Bulletin*, the following useful list of precautions to avoid accidents:

Do start gradually. Remember that you may not have been doing physical work of this type during the winter months. Break into it slowly.

Plan the work that you can do, and don't attempt to save money by doing hazardous jobs for which you are not qualified. You'll find it less expensive to hire a specialist to do the difficult or technical work than it is to suffer bodily injury.

Check your tools before you start the year's work—make sure they're in top shape. Serious injury can result from a tool breaking while under stress. And remember that a sharp tool is safer than a dull one, because it requires much less pressure to cut.

Don't get on one of last year's ladders without checking it completely, particularly if it has been exposed to the weather. Remedy any weak or broken places which might part under strains.

Don't try to impress your wife by lifting too heavy a burden, and never lift with your arms or back. By lifting only a moderate amount and letting your leg muscles supply the power, you can avoid strains.

If you don't know for sure what's in all of last year's cans, jars and bottles, throw them away. Insecticides and garden poisons can be extremely dangerous, and should be used only in accordance with the manufacturer's instructions. Taking a chance could cost you your life. Your county agricultural agent will be glad to supply you with information about these substances.

Even if you don't have small children around, remember that some might stray into your yard or garage. Don't leave anything dangerous where it might tempt them.

Do your work properly, using the proper equipment. Trying to improvise causes accidents. So does leaving a job half finished without erecting safeguards. Don't take it for granted that everyone knows what you are doing – but make sure you do.

Put your tools away when you're finished with them – even if it's only temporarily. And never leave sharp cutting edges exposed. Remember that serious injuries can result from such simple things as leaving rake tines turned up.

Do enjoy your work. If it becomes a burden, you're probably doing too much. Remember that you have a full-time job during the day – don't have another during your leisure time.

Remember that there's always a tomorrow, and if you take it a little easier today, you'll have a much better chance of being around to enjoy it.

IT MUST BE SPRING

From where I stand,
With drill in hand,
Had I a chance to look up,
I'd see a river, ambling on,
An apple tree, a field of corn.
Scenes like these are sure to cook up
Wild desires, but, after all —
They are only pictures on the wall.
So, here I'll stay, and drill and drill,
Finding life a bitter pill.

Ethel Hewitt

That Man in the Laboratory

By MAURICE J. TEITELBAUM, D.D.S.

IF the fifty-two weeks of the year aren't already taken, I'd like to put in a reservation for a Be Kind To Your Laboratory Man Week. Each year there's a week set aside for the adulation of Scouts, teachers, flowers, dogs, antiques, fish, street cleaners — why not one for the laboratory man? After all, if you have a good general practice, that man in the laboratory is the man in your life! Amalgams may be the "bread and butter" of dentistry but it's the prosthetic work that enables you to bring home the bacon. A successful and lucrative practice is largely dependent upon satisfactory prosthetic service, which, in turn, is more readily assured by the existence of understanding and cooperation between the laboratory technician and the dentist.

What kind of man is the laboratory man? He is short, tall, fat, thin, and most likely a regular fellow who is interested in doing a good job and in satisfying the dentist for whom he works. In other words, he is an average American trying to make a living in his chosen field. Of course, there are irresponsible and unethical men in the laboratory business just as there are in any other trade. But the laboratory men who practice dentistry illegally, chisel on the weight of precious metals, use inferior materials, or employ other underhanded business methods are in the minority.

Most laboratory men try to keep pace with the rapid strides made by the dental profession. They take courses, study latest techniques, buy the latest equipment, and try earnestly to produce finer prosthetic appliances in accordance with the needs and demands of the dentist. Their business is more efficiently run than that of their associates of the past and consequently they give better and faster service. The relationship between the dentist and his silent partner — in a way he is a partner for his income is directly proportional to the income of the dentist — is a delicate one. To get the best results from his technician the dentist must use tact and understanding. Here are ten important tips for teamwork between the dentist and the man in the laboratory.

1. *Treat the Technician As Your Friend*

The success of any team must be built upon the firm foundation of mutual respect and admiration. As a professional man you have the respect of your technician, and as a specialist in his field of endeavor he deserves your respect. Don't talk down to your laboratory man. Treat him as an equal and as a friend.

2. *That Man in the Laboratory Isn't a Magician*

No technician, no matter how proficient, can produce a good fitting partial denture from a faulty bite registration and an impression that is far short of the areas designed to be covered. If you want good results from your laboratory, you must do your part and provide adequate tools.

3. *Be Tolerant*

Many of you have on occasion sent good impressions to your laboratory and in return have received ill fitting partials, over-extended dentures, or poorly finished fixed bridges. Without doubt, the technician was entirely at fault. However, if he was a reputable and responsible man he was probably glad to correct his mistake and sorry for the inconvenience he caused you. But since all of us have had fillings loosen up or teeth crack under the force of our forceps, be tolerant —none of us is perfect.

4. *Be Specific in Your Instructions*

State laws require a written prescription for all work which is sent to the laboratory but there is no law forbidding an even closer relationship between you and your technician. Call your laboratory man, visit him, and talk over your big cases with him. Tell him of the results you expect to achieve and what you expect of him. Explain to him the manner in which you want your dentures finished or your veneers extended. Some men prefer rugae on their full uppers and others want the palate to be smooth and even. Some dentists want the gingival margin of their veneer crowns to end at the gum line and others want the finish to be extended beneath the free margin. Your laboratory man isn't a mind reader; tell him exactly how you want your work done, for his desire is to please you.

5. *Good Work Is Worth Good Words*

When you receive a beautifully finished jacket that is carved to anatomical perfection and in harmony with the other teeth in the arch, call your laboratory man and tell him how pleased you are. Don't be stingy with kind words. We all want to be complimented and praised when we do a good job and that man in the laboratory is no exception.

6. *Don't Be Sloppy*

Be as neat with the work you send to the laboratory as you are with the work that goes into your patient's mouth. There is no room for sloppiness in any phase of dentistry. When the laboratory sends you a set of finished dentures they aren't wrapped in a piece of newspaper and streaked with pumice. Most likely they are beautifully polished and packed in a box lined with absorbent cotton or in a cellophane bag. The next time you send him an impression be sure it's an impression of a clean mouth and that it isn't filled with thick ropy saliva and flecked with food particles. See that your impressions are clean and are folded in a piece of tissue or some other suitable wrapper before placing it into the laboratory envelope.

7. *Give the Technician Ample Time*

If you must have a piece of work returned in a week, don't send it down to him Monday morning marked "Rush for Wednesday." Give the lab man time to do the work properly if you don't need the case in a hurry. Rushing invites remakes, which means time wasted for both of you.

8. *Don't Be Smug*

Many dentists, especially the younger ones, can usually pick up valuable tips from the experienced laboratory man. These pointers may save you time and effort, yet some men feel that because the advice comes from the laboratory technician it is *verboten*. That's nonsense! A good laboratory man is in contact with many dentists and gets many valuable suggestions from them which he can pass on to you. You are not compelled to follow any of his tips but at least keep an open mind and perhaps it will benefit you. Don't be smug; none of us knows all there is to know about the science of dentistry.

9. *Speak Up*

If you're not satisfied with some of the things your laboratory man is doing, tell him about it. Don't drop him without giving him a chance to make good. If a patient is not pleased with work you have done for her, you, too, would rather have her tell it to you than to another dentist. After you have given the technician another chance, if you still aren't satisfied then you can look for the type of laboratory man who gives you the results you want.

10. *Pay Your Bill*

Laboratory bills in a good practice can rise to astronomical figures when they go unpaid for a few months. Don't let yourself fall too far behind in your laboratory bill. Money owed makes things unpleasant for the debtor as well as the creditor. Your laboratory man trusts you, but it's the same old story—he has bills to pay also.

Figure 1. **Grain size in metals, ranging from extremely coarse (top) to fine (bottom).**

The Role of [G]rain in Cobalt-Chrom[ium] [Al]loys

By [W. H. GRA]NT,

Editor's Note: Readers of TIC are [also] science. Authoritative articles on this [subject] background, training, and experience [to] One of these men is Dr. Grant, a [graduate] Massachusetts Institute of Technology. [He] present this definitive interpretation [of] dental alloys.

ALMOST everyone has at one time or another seen crystals. Crystals are readily recognized because of the well defined outward shape which follow regular geometric patterns. Galena or pyrite is a common example of an outwardly perfect shaped crystal. This outward perfection of shape in turn is evidence of the inward perfect arrangement of atoms in definite patterns.

All metals (and alloys) are formed of many crystals; however, because the outer shape of each crystal is not perfect, the metallurgist refers to "grains," not crystals, and to grain size. Each of these grains is a true crystal because of the specific atomic arrangement of each. But during the freezing of the metal, many small crystals start to grow (exactly as ice crystals grow in freezing water). The final shape of each crystal depends on how and when it finally meets other growing crystals. This results in inwardly perfect crystals but outwardly imperfect crystals which by definition are called grains.

Ordinarily, the grains of a metal are not visible to the unaided eye because of their very small size. This is particularly true of wrought materials. Castings frequently have grains large enough to be seen with the unaided eye, on the other hand. One may easily bring out the grain size by etching the metal or alloy. After first polishing the surface of the metal, it is attacked by any one of many acids or combinations of acids which remove some of the metal off the surface. Such acids are aqua regia, hot dilute hydrochloric acid, and so forth.[1] If the grain size is very fine, then a metallurgical microscope may be necessary to see the grains, but in coarse-grained cast structures the grains are usually visible to the eye after etching.

An example of a visible grain size is shown in Figure 1. Here the grains vary in one bar from a size barely visible to the eye to more than 2 inches long in the very coarse bar. The grain structure of a forged cobalt-chromium alloy is shown in Figure 2 at a magnification of 100 times to enlarge the grains to make them visible.

Because the grains are the very important building blocks of a metal or alloy, it is necessary to know the size of the grains and how they control the strength and ductility properties of the metal.

For use at normal temperatures, the metallurgist has almost always specified *fine* grain size. This is so because fine-grained metals are harder, stronger, more consistent and reproducible in their behavior than are coarse-grained metals. These differences are particularly evident when comparing very fine-grained metals with very coarse-grained metals. A fine example of the

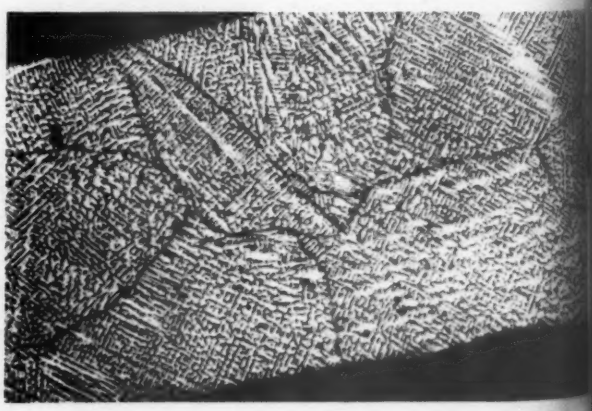


Figure 3 A. **Coarse-grained cast cobalt-chromium dental alloy. Individual [grains] marked out. Note only 2 or 3 grains across clasp diameter. 50 [magnification]**

...n Size in Cast ... Dental Alloys

By ...NT, ScD.

...IC are al... on this su... erience to ... Grant, a ... echnology ... retation o...

...ed in metallurgy's contributions to dental ...rce, for relatively few men are equipped by ... material.
...he staff of the Department of Metallurgy, ...arrangement with Dr. Grant, TIC is able to ...ance of grain size in cast cobalt-chromium

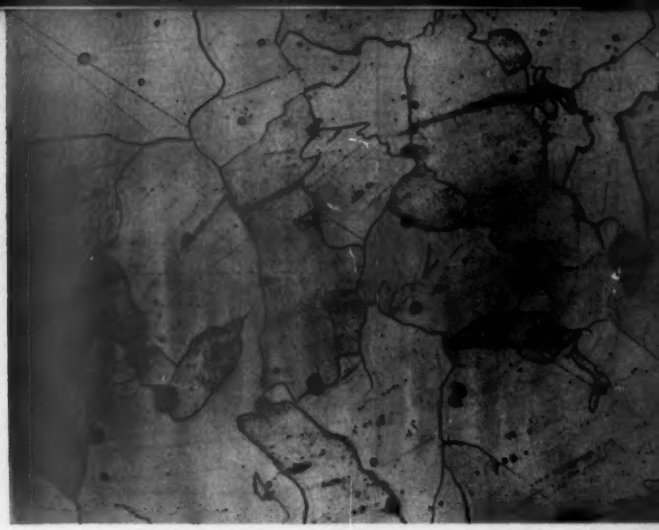


Figure 2. **A 75 cobalt-25 chromium alloy. Etched with aqua-regia to reveal grain size at 100 magnification.**

large difference in grain size which can exist among similar metals intended for the same use is seen in Figures 3 A and 3 B. The Figure 3 A photomicrograph shows a very coarse-grained dental casting (clasp portion). Note that only 2 or 3 grains exist across the clasp section.

Figure 3 B shows a similar cast clasp section, but here the grain size is so fine that 40 to 50 grains occupy the same section as Figure 3 A. The coarse grains are sufficiently large so that they can easily be detected with the naked eye in the etched casting.

The effect of grain size on the mechanical properties of metals has long been known.[2] One of the most common methods of estimating the strength of a metal is the tensile test, the data of which yield a graph in which stress (pounds per square inch) is plotted against strain (percent elongation). Figure 4 shows a typical stress-strain tensile plot. Up to a stress of A or an elongation of A' the metal shows completely elastic behavior; that is, if the load or stress is removed, the metal regains its original shape and form, and no permanent stretch (or bending) is achieved. The stress at A is called the "proportional limit." If one now puts on a greater stress, B, the metal will deform a small amount which is not recoverable. The metal is permanently stretched (or bent). By definition, B is called the yield strength and can be selected as one likes for 0.01, 0.1, or 0.2 percent offset. The point B is found by drawing a line parallel to the curve OA at a selected distance of 0.01, 0.1 or 0.2 percent from the origin, point 0. The yield stress simply tells how much stress a metal will withstand before it is permanently stretched a specified small amount. As the stress is increased from B to C, the metal stretches from B' to C', all of the stretch being permanent and not recoverable elastically. At C' the metal fails by cracking. The stress C is the tensile stress and measures the breaking stress.

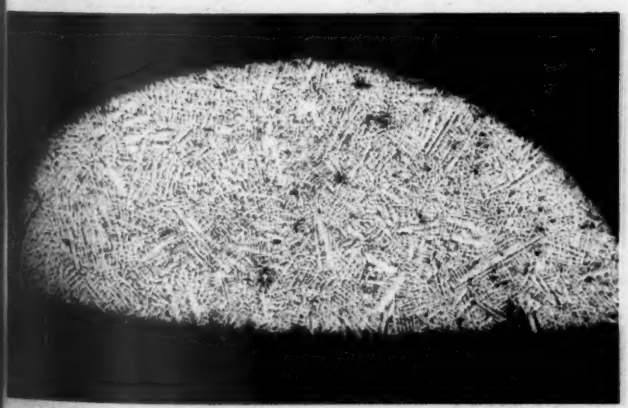


Figure 3B. **Fine-grained cast Ticonium. Individual grains very fine and hard to delineate. At least 40-50 grains across small diameter of clasp. 50 magnification.**

Grain Size Effects in General

Figure 5 shows the effect of grain size on the tensile and yield strength values of ordinary iron at room temperature.[2] In specimens 1, 2, and 3 of Figure 5, the average diameters of the grains were 9.7, 7.0 and 2.5 mm. respectively. In the other curves the number of grains per sq. mm. is shown in the brackets beside the number of the test bar. *Note that the proportional limit, the yield strength, and tensile strength all increase very markedly as the grain size becomes finer. The coarse grain is very weak.* When the number of grains per sq. mm. is about 50, the yield strength is 20,000 psi and the tensile strength is 35,000 psi. In the coarse-grained iron where each

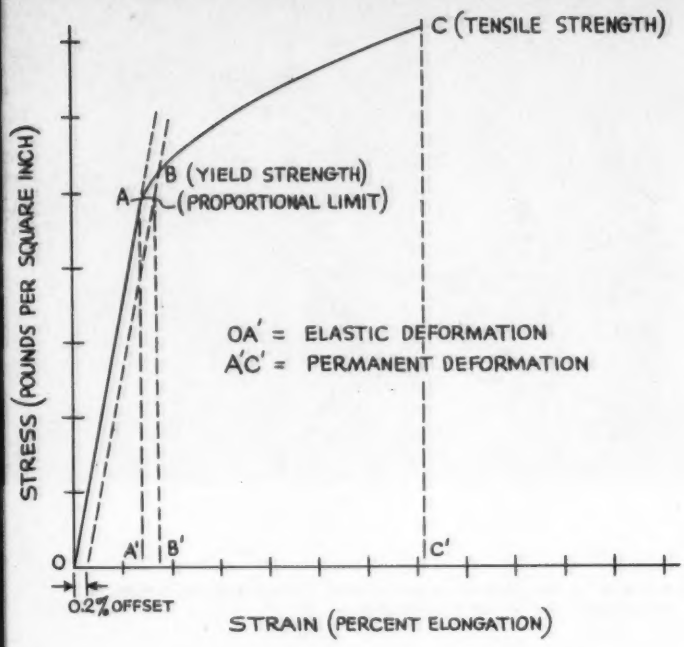


Figure 4. Tensile strength (stress-strain) curve showing commonly measured values.

grain is 3 mm. in diameter, the yield strength is only 14,000 psi and the tensile strength is 27,000 psi. This represents a significant loss in strength in going from fine grain to coarse grain.

Grain Size Effects in Dental Alloys

It is to be expected that similar behavior as noted above for pure iron might be noted in cast alloys, in cast dental alloys, for example. The element of doubt exists because in cobalt- chromium alloys there is an added complication in that an "aging" behavior, the precipitation of another chemical compound, usually occurs on cooling the metal from the casting temperature to room temperature.[3] This results in a duplex structure in which the scattered second phase increases the strength and resistance of the alloy to deformation. In an effort to see if such side chemical reactions might obscure the grain size effect, four alloys, representative of cast cobalt-chromium dental alloys, were cast to yield a range of grain sizes. These cast test bars were then tested in the as-cast condition to determine the effect of grain size on the tensile properties of the alloys.

Casting and Testing Procedure

Master melts were prepared of the alloys shown in Table I. These master melts were then remelted in a small electric arc furnace. The temperature was measured very accurately by means of a platinum, platinum-10% rhodium thermocouple to permit accurate casting temperatures. The flasks were fired and then cast at the temperatures shown in Table II.

It is definitely known that the speed with which a metal freezes controls its grain size. This is the most important factor — solidification rate. A metal heated only a little above its melting point will freeze rapidly and give a fine-grain size. A metal overheated by several hundred degrees above its melting point will cool very slowly as it solidifies and the grain size will be coarse. The use of very hot flasks or molds will, of course, serve to slow down the freezing rate and will further increase the grain size.

Returning to Figures 3 A and B again, the metal pouring temperature which gave the coarse-grained structure in Figure 3 A was 500° F higher than its melting point, whereas the metal in Figure 3 B was about 50 to 75° F above its melting point, resulting in a very fine grain size.

The cast test bars were of the dimensions shown in Figure 6. This test bar was used in order that metallurgically sound castings would be possible. If adequate gating and spruing of the bars were not provided in assembling the waxes, even these larger sections of short gage length showed shrink at one end and gave tensile values

Figure 5. Effect of grain size on tensile properties of iron. (From Carpenter and Robertson.)

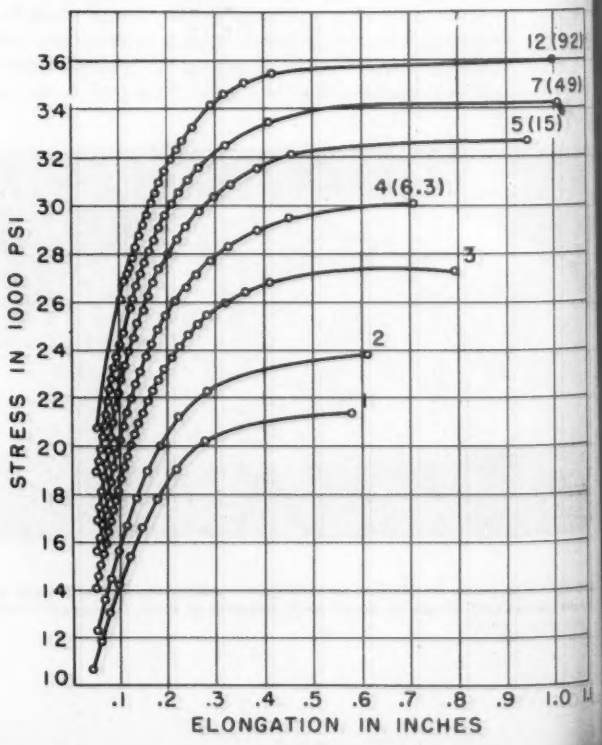


TABLE I

Alloy	Co	Ni	Cr	Mo	C	Be
V-I	64	2	27	6	0.25	—
V-II	66	—	27	6	0.27	—
6059	32	32	28	6	0.3	—
Ticonium (1% Be)	30	34	28	6	0.1	1

TABLE II

AVERAGE MECHANICAL PROPERTIES OF CAST COBALT-CHROMIUM BASE DENTAL ALLOYS

Alloy	Cast No.	Metal Temp. °F	Flask Temp. °F	No. of grains per cross section	Proportional Limit, psi*	Yield Strength* psi	Tensile Strength* psi	Percent Elongation
V-I	1	2550	1800	70-90	80,000	88,000	118,750	10.0
	2	2590	1800	20-25	78,000	88,000	113,300	9.3
	3	2695	1800	10-16	79,000	86,000	107,000	8.7
	4	2950	1800	1-4	76,000	84,000	104,000	8.3
V-II	5	2640	1000	50-60	89,100	96,600	126,300	7.1
	6	2695	1500	15-17	79,500	85,200	103,800	7.4
	7	2730	1850	4-6	79,000	86,000	104,200	7.7
	8	2950	1850	1-2	73,000	83,000	102,000	18.2
6059	9	2550	1800	25-35	58,000	64,000	94,000	15.4
	10	2590	1800	8-10	54,400	60,000	88,300	18.3
	11	2695	1800	3-5	53,800	57,700	87,500	15.9
	12	2950	1800	1-2	52,000	55,000	80,000	14.3
Ticonium	13	2400	1000	70	111,600	121,200	129,600	5.2
(1% Be)	14	2490	1000	35	81,800	89,400	122,300	7.0
	15	2490	1600	30	94,100	94,500	119,600	9.3
	16	2490	1850	18	71,800	78,700	107,200	9.2
	17	2730	1850	15	80,000	85,000	113,800	9.8

*These values are average for at least 3 tensile tests from each cast.

NOTE: Yield strength for 0.2% offset.

Test bars 0.160 inches diameter and 1.25 inches gage length.

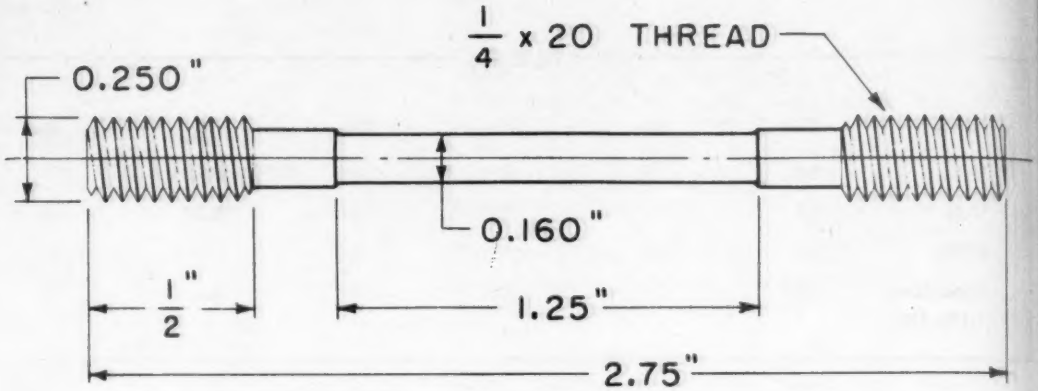


Figure 6. **Standard specimen for cast test bars for tensile tests.**

anywhere from 10,000 to 30,000 psi less than the real values. The use of cast wire test pieces 4 inches long by 0.125 inches in diameter[4] is out of the question since sound test specimens could not be cast in such sections.[5] Values obtained on such long thin cast wires usually run only from 50 to 75 percent of the real tensile values of the alloy.

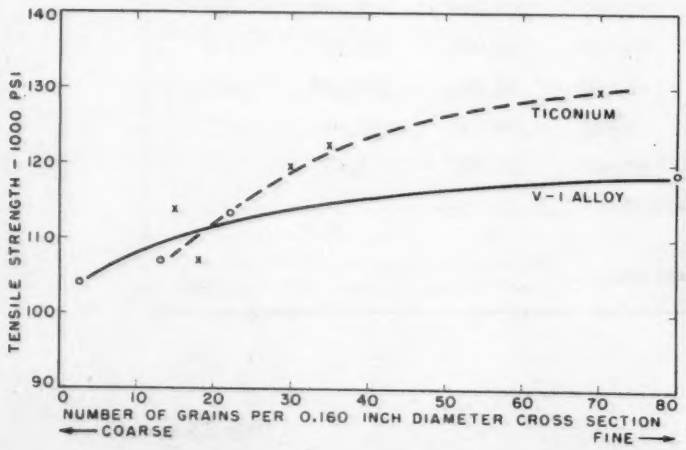
High Temperature Ransom and Randolph IC-711-G1 investment was used for all these casts to permit both high and low flash temperatures. Six test bars were cast in each flask.

Tensile tests were conducted on at least three test bars from each cast, after such bars were examined by X-rays and found to be free of porosity or other defects.

Test Results

Table II shows the average tensile test values for the four alloys as a function of the grain size. Figure 7 shows the curves obtained by plotting "number of grains per cross-section of the test bar" against the tensile strength. It is quite apparent that the fine-grained castings are appreciably stronger than the coarse-grained castings in all four cast dental combinations.

Figure 7. **Illustrating increase in tensile strength as grain size becomes finer for two dental alloys.**



Of equal importance is the ability to cast an alloy over and over again to the same high standards.

Table III lists the individual test values for two fine-grained casts and for two coarse-grained casts. *Note the very important greater consistency of the test results in the fine-grained casts. The inability to reproduce mechanical test values in coarse-grained castings has been noted and discussed in much greater detail previously.*[6, 7]

Briefly, since the strength values of metallic crystals are not the same in all crystallographic directions, the strength depends on the position in part of each grain and on the relative orientation or position of one grain to another. In coarse-grained castings, when only 1 to 4 or 5 grains occupy the entire cross section of the bar (or clasp) the mechanical properties are controlled by the particular position of the few grains, accordingly, a wide range of test values may be obtained. *This is evident for alloy V-I, cast No. 8 (Table III) where the yield strength varies from 65,000 to 122,000 psi and the tensile strength from 89,000 to 130,000 psi and the elongation from 4.4 to 20.6 percent.*

Fine-grained structures, on the other hand, yield values of strength and ductility which are the average of many individual grains in the

cross-section. Since the value is an average of the performance of many grains, the values are much more readily reproduced. Fortunately, as was noted from Figures 5 and 7, this fine-grain size is also stronger than the coarse-grain size.

It is interesting to note that for similar metal and flask casting temperatures, the Ticonium alloys are consistently finer-grained, and the 6059 alloys consistently coarser-grained. These alloys are somewhat similar, except that Ticonium contains an addition of beryllium which acts as a grain refiner (as one of the functions).

Conclusions

1. In common with all metals and alloys the fine-grained cast cobalt-chromium dental alloys are stronger than the coarse-grained.
2. The reproducibility of strength and ductility values is vastly greater for fine-grained dental castings than for coarse-grained castings.
3. Accurate control of the metal pouring temperatures is vital to obtaining reproducible grain size in cast dentures.

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TABLE III

REPRODUCIBILITY OF MECHANICAL PROPERTIES

Alloy	Cast No.	Metal Temp. °F	Mold Temp. °F	No. of grains per cross section	Proportional Limit, psi	Yield Strength psi	Tensile Strength psi	Percent Elongation
V-II	8	2950	1850	1-2	62,000	65,000	89,000	20.6
					63,000	65,000	93,000	18.5
					92,000	122,000	130,000	4.4
					75,000	80,000	96,000	14.9
V-II	5	2640	1000	50-60	85,000	92,500	121,200	6.6
					92,500	97,500	130,000	7.7
					90,000	100,000	127,600	7.0
Ticonium	13	2400	1000	70	110,000	120,300	138,800	4.7
(1% Be)					115,000	123,000	151,000	6.7
					110,000	120,300	128,100	4.3
6059	11	2695	1800	3-5	52,500	56,000	90,000	18.4
					50,000	54,000	77,500	9.4
					59,000	63,000	95,000	20.0

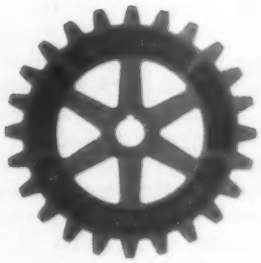
NOTE: Yield strength for 0.2% offset.

Test bars 0.160 inch diameter and 1.25 inches gage length.

℞ *for Living*

DR. J. H. CAMPBELL – ROTARIAN

By JOSEPH GEORGE STRACK



"I HAVE nothing but the kindliest feeling for every living thing."

That philosophy, variously expressed, reflects the wisdom of those who have successfully made the three great adjustments to life that every human being must make – adjustment to God, to society, and to oneself.

We have great systems of religion, of philosophy, and of government, a wide range of ways of life and of social institutions, all offering us help in meeting these three basic tests of life.

An uneducated man can orient himself in his approach to the Creator, to his fellow men, and to himself as soundly as the most learned philosopher can. Whether humble laborer or world leader, the man who has learned the full significance of serving others is rewarded with the fruits of that three-level adjustment to life: the highest wisdom of all, knowing how to live fully, effectively, and happily.

Serving the Community

Such a man is Julius H. Campbell, D.D.S. Dr. Campbell, as long as he can remember, has been interested in people – in what they did, what they thought, their aspirations, their everyday lives. His knowledge of people has made it possible for him to recognize their needs, and his concern for their welfare has motivated him in helping them to fulfill those needs. For example, he saw the necessity for a Parent-Teachers Association in his community. He assisted in setting up a PTA unit and served as its president. The economic and social needs of the community were equally apparent to him; so he helped to organize the local Community Chest, and, once again heeding the wishes of his neighbors, became its president. Concerned with young and old alike, he has worked in all phases of the Boy Scout program; is a dental adviser to the local Selective Service Board; and is an active member of the board of directors of a county home for the aged. Nor has he neglected spiritual and cultural needs. He serves as president of the trustees of the Presbyterian Church and as a Ruling Elder. He helped to organize the Community Concert Association and is presently one of its directors and vice-president.

Serving the Profession

Dr. Campbell serves his profession as devotedly as he does his beloved community of Emporium, Pa. He has been in general practice for a quarter-century, all of it in Emporium. He started practice there in 1925, the year he obtained his dental degree from the University of Pittsburgh Dental School. He has served as director, vice-president, and president of the Eighth District Pennsylvania Dental Society; as a member of the House of Delegates of the Pennsylvania State Dental Society; and is a member of the Eighth District and State bodies, the American Dental Association, and the American Society of Dentistry for Children.

That deep interest in people, which has made countless acquaintances and friends for him, gradually extended to the whole community, first his hometown, then the national community, and eventually the world itself. Life for him soon became a crowded, fascinating, exciting, and rewarding experience.

An Approach to Life

To professional men who have reached maturity with personalities distorted by the burdens of professional and other obligations, or by the pressures of twentieth-century problems, the story of Julius Campbell should be therapeutic in its inspiration. Dr. Campbell has as many professional burdens as the average professional man. He has, perhaps, more non-professional obligations. He is as aware of the ills of the world as any other man. Instead of being worried, maladjusted, neurotic, or otherwise unable to enjoy life, he is cheerful, friendly, helpful, and

happy, and life is a fascinating adventure for him. Why? Because he faces life, rather than avoids it. He works on its problems, instead of worries about them. He long ago made the basic spiritual, social, and personal adjustments which gave him the sense of security, the abiding faith, the will to action, and the understanding of his fellow men that characterize all sound, mature personalities.

His desire to serve people was a dominant factor in choosing a healing art for his career. Being able to help his friends and neighbors professionally as well as personally, means a great deal to him. "I get that much added satisfaction out of everything I do in dentistry," he says. "My patients seem to be aware of this – aware that I 'like my work' – and appreciate it."

Dr. Campbell is naturally attracted towards persons who share his own philosophy. When he discovered that the program of Rotary was based on ideals of serving others through world fellowship, he knew he had found a framework of organization within which he could exercise more effectively and more widely his own philosophy of life.

Dr. Campbell

Rotary, a Program of Service

He became a member of the Emporium Rotary Club. That was in 1942. Today, naturally enough, he has risen to leadership in Rotary as a District Governor, his district comprising forty-two clubs in three States – Pennsylvania, West Virginia, and Maryland. During the year he holds this office he will travel more than 20,000 miles, in all kinds of weather and over all kinds of roads. He will give up weeks of personal and professional time, and expend personal funds and lose professional income. But he does not talk of losses or of sacrifices. Instead, he says: "The satisfaction and joy you earn for yourself makes it an experience which you would not trade for anything. Indeed, the satisfaction derived from being a District Governor is only an enlargement of the satisfaction derived from being a member of a Rotary club, for it is in direct proportion to the service one renders."

Speaking of dentists as prospective Rotarians, he comments: "By the very nature of our profession it would seem to me that members of the healing arts should naturally make good Rotarians. Fundamentally, our first purpose is to serve our fellow men by the relief of pain and suffering, by the restoration of health and good appearance, and by the prevention of disease through education and the care of children's teeth. In like manner, service is the foundation of Rotary: service through fellowship, which makes for better relations between men in a community; service through vocations, which makes for better relations between business and professional men and their customers and patients; service in the community, which makes for a better place in which to live, rear our children, and practice our professions; and service internationally, which makes for a better world and the hope of a world at peace and prosperous. Being truly international in scope, with clubs in eighty-three different countries, Rotary is in a positive position to promote international understanding through its membership, which constitutes outstanding business and professional men in approximately 7,200 communities throughout the world."

Dentists who are interested in extending their friendships, in participating in community-betterment projects, in promoting high standards in business and professional life, and in advancing international understanding, good will, and peace, should investigate the opportunities offered by Rotary, District Governor Campbell advises. He stresses that Rotary does not seek to supplant or interfere with any religious or political institution, and that it does not endeavor to promote civic activities rightfully belonging to

other organizations, but rather "seeks all that which brings people together and avoids all that which separates them."

Like all Rotarians, Dr. Campbell is especially proud of the work done by Rotary for crippled children, one of the great voluntary social service programs in the United States. He is enthusiastic about the possibilities of Rotary's newest program, made possible by the Rotary Foundation. The Foundation awards fellowships to carefully selected college graduate students from all over the world. These fellowships consist of grants ranging from $1,800 to $3,400 for one year of advanced study in universities located in countries other than the countries of the grantees. Trained in international understanding, these young people, it is hoped, will become the potential leaders of their countries in the years to come. This world-wide project, now in its fourth year, is regarded by government leaders, educators, and experts in the field of international relations as a "decisive step in the achievement of world peace." To date 285 fellowships have been granted at a cost of approximately $750,000.

"A half-century ago Rotary was regarded as a luncheon club with hardly more than sociability in a few local communities as its goal," Dr. Campbell comments. "Today it is a social institution whose force for good has been felt throughout the civilized world. It is not a religious, political, commercial, 'do-good' or 'Babbitt' organization, but a world-wide association which gives men the opportunity to serve their local, national, and international community under a charter of goals that is strikingly similar to the charter of the United Nations."

Rotarians have two favorite mottoes: "Service above self," and "He profits most who serves best." To the many maladjusted of our time these ideals are, at best, childish story-book sentiments. The answer to these skeptics is the long list of achievements of the Julius Campbells of the world.

Doctor, Do Your Patients Need These Lessons?

By MORRIS TANENBAUM

At last!

I have finally learned how to brush my teeth!

Yes, on my thirty-seventh birthday, without any apologies, my dentist gave me a complete demonstration and lecture on toothbrushes, toothpastes, brushing techniques, and probable brushing errors. He even showed me portions of his own abrasion-scarred tooth structure stemming from youthful bad habits.

Upon checking, I learned that no patient, young or not-young, old or new, leaves his office without a thorough check-up of brushing and cleaning techniques.

Why? Because of a little nine-year-old girl.

The child's mother, a patient over many years, was worried about the brushing habits of the child. She worried because her child's teeth might be harmed, and because the child refused to change her habits.

My dentist called mother and child into his operating room. Giving the child a toothbrush, he said, "Now, show me exactly how you brush your teeth — every single step."

The little girl did so, from beginning to end. When she had finished, dentist looked at her and asked, "Who taught you to brush your teeth that way?"

"My general science teacher," the child explained.

He patted her on the shoulder reassuringly and told her she had just given a perfect demonstration of the best brushing techniques.

"We owe the science teacher an apology for our doubts," he tactfully suggested to the little girl's mother, adding: "And all of us can take lessons from your daughter."

According to my dentist, this experience taught HIM a valuable lesson: he could not afford to assume that anyone really knew how to brush and clean teeth. The skeptical, critical child's mother, a good, experienced dental patient, did not know. Indeed, she had been trying to compel the child to abandon the best brushing and cleaning techniques.

From that day on, my dentist has been making certain that every one of his patients gets lessons in brushing teeth correctly.

That is how I finally learned the right way, after thirty years of dental appointments! My former dentists had assumed that I knew. My present dentist knows that I know, for he has taught me himself!